

# TRANSMITTAL OF APPEAL BRIEF (Large Entity)

Docket No.  
POU920010101US1

In Re Application Of: Notohardjono et al.

Serial No.  
09/902964

Filing Date  
July 11, 2001

Examiner  
J. Nguyen

Group Art Unit  
2829

Invention: SELF ALIGNING WAFER BURN-IN PROBE

## TO THE COMMISSIONER FOR PATENTS:

Transmitted herewith in triplicate is the Appeal Brief in this application, with respect to the Notice of Appeal filed on August 22, 2003.

The fee for filing this Appeal Brief is: \$320.00

- ☐ A check in the amount of the fee is enclosed.
- ☐ The Director has already been authorized to charge fees in this application to a Deposit Account.
- ☒ The Director is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. 09-0463

*Lawrence D. Cutter*  
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Dated: Sept. 17, 2003

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**BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

Applicant: Notohardjono et al. : GROUP ART UNIT: 2829  
Serial No.: 09/902964 : Examiner: Jimmy Nguyen  
Filed: July 11, 2001 : September 17, 2003  
Title: SELF ALIGNING WAFER : Lawrence D. Cutter  
BURN-IN PROBE : IBM Corporation  
: 2455 South Road, M/S P386  
: Poughkeepsie, NY 12601

**APPEAL BRIEF UNDER 37 C. F. R. § 1.192**

Hon. Commissioner for Patents  
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Alexandria, VA 22313-1450

Sir:

In view of the final rejection of applicants' claimed invention in the above-identified patent application, applicants herein respectfully request the Board of Patent Appeals and Interferences to consider the arguments presented below and to reverse the rejections imposed by the Examiner. Applicants' claims were finally rejected on April 23, 2003. In response thereto, Applicants submitted a response under 37 CFR § 1.116 on June 16, 2003. This response was fully within the two-month requirements set for in 37 CFR §1.136(a) which requires an Advisory response from the Examiner before the end on the period extending three months from the date of the Final Rejection. Applicants' attorney spoke with the Examiner on July 22, 2003 which was one day before the Advisory Action was due. At that point the Examiner indicated that he

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had not yet even seen the submitted response under 37 CFR § 1.116. An Advisory Action was finally mailed from the Patent and Trademark Office on August 13, 2003, and was received in the applicants' attorney's office on August 18, 2003. On August 22, 2003, a Notice of Appeal was filed. However, as a consequence of the failure of the Patent and Trademark Office, applicants' response on August 22, 2003, was forced to include a request for an Extension of Time in the amount of \$110. Had the Advisory Action been timely presented or if the Examiner had been willing or able to indicate that the rejections were still being sustained, this expense would have been unnecessary. Nonetheless, due to the situation, applicants submitted a Notice of Appeal with the requisite fee for a one-month Extension of Time on August 22, 2003. Accordingly, this Appeal is timely presented.

### **I. REAL PARTY IN INTEREST**

The real party in interest in the above-identified patent application is the Assignee thereof, namely, International Business Machines Corporation.

### **II. RELATED APPEALS AND INTERFERENCES**

There are no other appeals or interferences known to the Appellant which directly or indirectly affect or have any bearing whatsoever on the Board's decision in the present appeal.

### **III. STATUS OF CLAIMS**

Claims 1 through 9 stand rejected under 35 U.S.C. § 112, second paragraph. Claims 1 through 9 also stand rejected under 35 U.S.C. § 102 based on the patent to Hamel et al. (U.S. Patent No. 6,404,211, issued June 11, 2002, and assigned to the same assignee as the present invention). No claim has been cancelled, and claims 1 through 9 are the subject of the present appeal.

#### **IV. STATUS OF AMENDMENTS**

There have been no amendments submitted for consideration subsequent to the final rejection by the Examiner.

#### **V. SUMMARY OF THE INVENTION**

Applicants' invention is directed to a probe assembly for making electrical contact with circuit elements on an integrated circuit wafer. The probe assembly includes a number of recited structural elements. In particular, one of these elements is a wire probe. This wire probe comprises a core material which is plated with material selected from the group consisting of nickel, gold, nickel alloys, and gold alloys. The wire probe has a core diameter 'd', a plating thickness 'p' and an offset 'L' as illustrated in Applicants' Figure 2. Most relevant to the present invention, the Applicants have discerned that there is a desired relationship that exists amongst these three variables (p, d, and L). In particular, the desired relationship for these variables is illustrated in Applicants' Figures 4A-4D. Applicants have discerned that it is desirable that these parameters be related in a very specific fashion so as to provide the probe assembly with certain desirable properties. These desirable properties include: (1) providing a sufficient contact force between the probe and the circuit wafer; (2) providing the desired contact force consistently over many operations; and (3) providing a contact force which is consistent with long probe lifetime.

#### **VI. ISSUES**

There are two issues presented herein:

- (1) The rejection of Applicants' claims 1 through 9 under 35 U.S.C. § 112; and
- (2) The rejection of Applicants' claims 1 through 9 under 35 U.S.C. § 102 based upon the patent to Hamel et al.

## VII. GROUPING OF CLAIMS

No claim grouping is asserted herein.

## VIII. ARGUMENT

### **A. Issue Number 1**

Attention is first directed to the rejection of Applicants' claims under 35 U.S.C. § 112. The Examiner has objected to the Applicants' reference in claims 1 and 6 (and the claims which depend therefrom) to Applicants' Figures 4A - 4D. While it is admittedly unusual for a reference to a figure to be found within a claim, it is nonetheless permitted and indeed appropriate in certain circumstances. This is clearly one of those circumstances. In this regard, attention is redirected to the case of *In re Tanczyn* (CCPA March 11, 1953). In the case of *In re Tanczyn* reference to a figure was permitted. In *In re Tanczyn*, the claim in question limited the manganese content in a stainless steel alloy by reference to "amounts beneath the curve in the accompanying diagram." In that case, which met the criteria for the permissible use of reference to a figure in a claim, there was only one variable, namely, the manganese content. If a reference to a figure in a claim is permitted in a single variable case, then *a fortiori* it is permissible in a case which is more complicated and which in fact includes not just one parameter or two parameters but rather three parameters: p, d, and L. Accordingly, the case law in this area clearly supports Applicants' position that the reference to Figures 4A - 4D in Applicants' claims 1 and 6, and the claims which depend therefrom, is not only appropriate but clearly more than just convenient but is actually necessary, particularly if the claim is to serve the intended function under United States patent law of properly defining the claimed boundaries of an Applicant's intellectual property to those of ordinary skill in the art.

However, even if one does not rely upon case law, common sense and an understanding of the purposes of 35 U.S.C. § 112 clearly favor Applicants' position. In particular, it is noted that 35 U.S.C. § 112 is designed to provide a description of Applicants' invention in ways which are most readily understood by those of ordinary skill in the art, both in terms of being able to practice the invention and in terms of being able to avoid infringement of the claimed invention.

Those of ordinary skill in the art are fully capable of understanding the relationship between the variables  $p$ ,  $d$ , and  $L$  as set forth in Figures 4A - 4D. The last two hundred years of mathematical thought have taught the technical world that it is equally useful to have relationships between variables described graphically as opposed to being described by a set of equations. It should also be fully appreciated that the well known rubric "a picture is worth a thousand words" is fully applicable here. Even if Applicants' attorney were to attempt to describe the regions set forth in Figures 4A through 4D in words, the resulting textual description would be long, obtuse, hard to understand, and in the end would be nothing more than a mere regurgitation of the information content provided graphically; albeit, now in a much less useful form.

Applicants' attorney would also like to point out that another government agency is also adopting a more graphical approach. In particular, the Federal Aviation Administration has either adopted or is in the process of adopting graphical depictions of areas across the US subject to temporary flight restrictions (TFRs). Previous textual-only descriptions of these regions have resulted in pilot confusion and difficulties in understanding the boundaries. In light of these difficulties and the undesirable air space incursions that can and have resulted, the FAA is indeed adopting an approach which is more understandable to human beings. Accordingly, as a point of information and consideration, it is therefore noted that at least one other federal agency is also adopting a graphical or visual approach. Clearly such approaches are more understandable and appreciated by human beings; and patents are likewise federal documents intended for use by human beings.

Also, as pointed out in the record herein, it is furthermore noted that Figures 4A - 4D do indeed provide a sufficient indication of those values of  $p$ ,  $d$ , and  $L$  (selected conjointly) which would be infringing values. In particular, it is noted that in paragraph 28 of Applicants' specification, it is stated that "for values of  $p$  between the selected values [referring to the drawings for  $p = 0.3$  mils,  $p = 0.4$  mils,  $p = 0.5$  mils and  $p = 0.6$  mils] linear interpolation provides an acceptable approximation in the  $p$  direction." Consider for example the situation in which  $L = 70$  mils,  $d = 1.4$  mils, and plating thickness is  $p = 0.3$  mils. Clearly, this is a point in Figure 4A which is outside of the accepted region. However, if the plating thickness  $p$  were 0.6 mils, this would be an acceptable set of values for  $p$ ,  $L$ , and  $d$ . Clearly, the point for  $L = 70$  mils

and  $d = 1.4$  mils appears at the same relative point on each of the four figures shown (4A - 4D). Also clearly, plating thicknesses of 0.3, 0.4, or 0.5 mils are seen to lie outside of the acceptable regions for these values of  $L$  and  $d$ . The fact that this point lies within the acceptable region shown in Figure 4D for a plating thickness of  $p = 0.6$  mils indicates that there is a change from acceptable to unacceptable for this value of  $L$  and  $d$  between a plating thickness of 0.5 mils and 0.6 mils. A measurement from Figure 4C indicates that the  $L = 70$ ,  $d = 1.4$  point is 2 arbitrary units vertically away from the acceptable region. Likewise a similar measurement in Figure 4D indicates that there is a distance of 5.5 arbitrary units between the point  $L = 70$  and  $d = 1.4$ . This yields an interpolated increment from Figure 4C of  $(2/(2 + 5.5)) \times 0.1$  mils, thus indicating that here the change from acceptable to unacceptable occurs at a plating thickness of approximately 0.53 mils. Accordingly, it is seen that it is trivially easy even for those of meager skill in the technical arts to determine what is and is not an acceptable set of values for  $p$ ,  $d$ , and  $L$ . In point of fact, any freshman college math student completely unskilled in the relevant arts could make this determination. It is also noted that forty years ago even freshmen high school students were instructed in the art of linear interpolation in the calculation of common logarithms. Linear interpolation is thus clearly seen to be not only easily applied but also widely understood by anyone having finished the first year of high school! Accordingly, it is seen that the reference in Applicants' Claim 1 to Figures 4A - 4D is not only desirable, it is essential for claim clarity and furthermore it is extremely easily understood, even by those of meager skill in any technical art.

Accordingly, it is clearly seen that those of ordinary skill in the art would fully and unambiguously understand the recited limits of the claimed invention. Furthermore, it is equally clear that, if applicants' attorney were to translate the four figures shown into a set of at least twelve separate equations, it would be much more difficult for the reader to discern the limits of the claimed invention. Equations are nice when the goal is manipulation and solution, but they often fail miserably when the goal is depiction. This is especially true when there is more than one equation; here we would have at least twelve together with corresponding sets of applicable ranges.

Applicants herein are also aware of the language found in MPEP § 2173.05(s) which is reproduced below in relevant part for the convenience of the Board:

"Where possible, claims are to be complete in themselves. Incorporation by reference to a specific figure or table "is permitted only in exceptional circumstances where there is no practical way to define the invention in words and where it is more concise to incorporate by reference than duplicating a drawing or table into the claim. Incorporation by reference is a necessity doctrine, not for applicant 's convenience." *Ex parte Fressola*, 27 USPQ2d 1608,1609 (Bd. Pat. App. & Inter. 1993) (citations omitted)."

Applicants assert that: (1) there is no other practical way to define the invention; (2) that the reference in Applicants' claim 1 to Figures 4A - 4D is not merely for the convenience of the Applicant; (3) that the direct inclusion of Figures 4A - 4D into claim 1 is the antipathy of conciseness; (4) that the case of *Ex parte Fressola* is clearly distinguishable; (5) that the case of *In re Tanczyn*, 202 F.2d 785, 97 USPQ 150 (CCPA 1953) is much more relevant than the case of *Ex parte Fressola* which cites *In re Tanczyn* approvingly; and (6) that the case of *In re Tanczyn* speaks with more legal authority than *Ex parte Fressola*.

With particular reference to point (4) above, it is noted that the case of *In re Fressola* deals with the issue of the older, now unapproved *omnibus* style of claim drafting. In particular, the claim in *In re Fressola* reads: "A system for the display of stereographic three-dimensional images of celestial objects **as disclosed in the specification and drawings herein.**" [Emphasis added in this Brief.] In contrast, the claim in *In re Tanczyn* reads as follows: "In manufactures of the class described, wrought and polished straight chromium stainless steel sheet, strip, wire and like products containing large amounts of chromium and small amounts of manganese and silicon which products are substantially free of surface-defacing complex silicate inclusions and comprise 10% to 27% chromium, up to about 0.2% manganese and from incidental amounts up to about 1% silicon **with said manganese content restricted to amounts beneath the curve in the accompanying diagram corresponding to the specific amount of said chromium**, and the remainder substantially all iron." [Emphasis added in this Brief.] It is also noted that the court in *In re Tanczyn* had no problems whatsoever in reading and applying the claims vis a vis the cited art.



With reference to point (1) above, it is noted, as pointed out above, that the textual description of Applicants' invention would have to include the recitation of **at least one dozen separate linear equations with each such equation being accompanied by a range of variables over which it was applicable.** This is neither a practical nor a desirable way to convey the import and scope of the invention which clearly depends on the complex relation amongst three independent variables. Not only is this approach impractical, it would also serve to introduce inexactitudes of measurement into the description. While measurements in the figures made by those of ordinary skill in the art would be more than adequate to define the scope of the invention, there is no need whatsoever to introduce the possibility of a claim drafter's textual and measurement errors into what is an already well defined description.

There is at least one other reason for permitting references to an Applicant's figures. In particular, it is noted that one of the major purposes underlying the entire U.S. patent system is the promulgation of information upon which others, upon reading the patent or published patent application, are able to devise still further improvements. For such individuals the graphic depiction of the claimed invention provides a significantly greater opportunity for grasping the underlying relations between the parameters. For example, those skilled in the art viewing Applicants' Figures 4A - 4D would easily be led to conclude that increasing the plating thickness increases the range of workable core diameter and offset parameters. Such information would not readily be ascertained from a mere listing of twelve or so equations. Having said this, Applicants' attorney is also aware of the counter argument that this goal can be achieved without necessarily referencing the figures in the claims. However, if improvement inventions are developed and are best described with reference to graphical representations, then an applicant's claim which references this graphical matter also provides the optimal means for distinguishing later claims by other inventors whose basis for further invention lies within the original graphic material.

**Comments Particular to the Advisory Action  
and the Rejection under 35 USC § 112**

For the very first time in the history of the prosecution of the present application, the Examiner asserted in the Advisory Action: "In figure 4D of the current invention the applicant [sic] fail to disclose the cutting point or the intersect point of the two lines on the graph. Therefore, the combination of the parameters L, p and d as claimed will be indefinited [sic]." This comment by the Examiner seemingly suggests a "reject at any cost" position. Firstly, the acceptable regions in all four portions (A, B, C and D) of Figure 4 are all clearly delineated both by lines and by stippling. Secondly, the Examiner falsely assumes that the lines shown have to intersect. There is no cutting point or intersect point as the Examiner asserts. Thirdly, all of the lines bounding the acceptable region for a plating thickness of 0.6 mils are clearly shown and delineated and for purposes of clarification, it is noted that the leftmost boundary line in Figure 4D just happens to lie on a vertical grid line. Other than this mere happenstance relative to the parameters involved, there appears to be absolutely no basis whatsoever for the Examiner to single out Figure 4D.

For all of the above cited reasons, it is Applicants' position that claim 1, as presently constituted, including the reference to Figures 4A - 4D, is in full compliance with 35 U.S.C. § 112. The invention claimed is specified in a clear, unambiguous, and furthermore easily comprehensible form. Furthermore, if a single variable is permitted to be described in a graphical way as in the case of *In re Tanczyn*, it is so very much more appropriate that a relationship specified amongst three variables be permitted to be described in a similar graphical fashion. If a single variable case is appropriate for this treatment, then a two variable case is even more appropriate and a three variable case becomes virtually impossible to describe otherwise. Accordingly, it is therefore respectfully requested that the rejection of Applicants' claims 1 - 9 under 35 U.S.C. § 112 be reversed.

**B. Issue Number 2**

It is preliminarily noted that the basis for the Examiner's rejection of Applicants' claims under 35 U.S.C. § 102 appears to be solely founded upon the rejection of Applicants' claims under 35 U.S.C. § 112. If the rejection under 35 U.S.C. § 112 is reversed, then the Examiner's arguments for the rejection under 35 U.S.C. § 102 vanish.

Attention is therefore next directed to the rejection of Applicants' claims 1-9 under 35 U.S.C. § 102. While the cited art discloses a very similar structure (which is to be expected when the art cited is assigned to the same assignee), the teachings found within the cited patent (Hamel et al., U.S. Patent No. 6,404,211) are nonetheless totally and absolutely devoid of any teachings whatsoever concerning the notion that there is a desirable relationship between the variables p, d, and L. However, as clearly set out in Applicants' claim 1 and the claims which depend therefrom, this relationship is specifically stated and found in all of Applicants' claims. Accordingly, there are in fact very significant differences between that which is claimed and that which is disclosed in the patent to Hamel et al. Furthermore, since Hamel et al. fail to teach, disclose, or even remotely suggest desirable relationships amongst the variables p, d, and L, the teachings of this patent cannot be used as a basis for rejecting Applicants' claims under 35 U.S.C. § 102 or even under 35 U.S.C. § 103. In short, the recitation found in lines 22-29 of Applicants' claim 1 clearly distinguish the present invention from that which is disclosed in Hamel et al. The recitations in Applicants' claim 1 describe aspects which are not present in Hamel et al., nor are they in any even remotely suggested by Hamel et al. Accordingly, for all of the reasons indicated above, it is seen that, because of the fundamental deficiencies found in the patent to Hamel et al., the rejection of Applicants' claims 1 through 9 under 35 U.S.C. § 102 cannot be sustained. It is therefore respectfully requested that the rejection of these claims be reversed.

**Comments Particular to the Advisory Action  
and the Rejection under 35 USC § 102**

In the Advisory Action received on August 18, 2003, the Examiner has stated: "Hamel et al are [sic] not fail to disclose, teach or even remotely suggest desirable relationships among the variables p, d and L rather the relationship of the parameters are common use for most of the probe structure when it comes to the point of contact from the probe and the device under test (the Applicants are advised to read US 6515496, US 6595794 and US 6529024)." It is first noted that these documents are not even of record in the present application and the Examiner has in fact made the specific choice of not providing them with the Advisory Action. If the Examiner wanted to or still wants to make any of these documents the foundation of a rejection, then the proper procedure would have been to open up the prosecution and to have provided the Applicants with a new, nonfinal Office Action. Clearly, this was not done. Furthermore, it is not clear whether the Examiner is merely quoting language that the Applicants' attorney has employed or is in fact admitting that the patent to Hamel et al. does indeed fail to "disclose, teach or even remotely suggest desirable relationships among the variables p, d and L." Clarification is requested. In particular, does the Examiner now concede that Hamel et al. do not appreciate that a select set of parameter choices for d, L and p lead to a probe with improved characteristics?

In spite of the fact that the three U. S. patents cited immediately above have not been provided, Applicants' attorney has nonetheless obtained text only versions of these documents and has found nothing to suggest any relationship amongst these three parameters. The '496 patent, while admittedly being directed to contact test probes, appears to be solely focused on the angle that the probe makes with the contacted surface. The device in this patent also appears to function because of S-shaped holes required in their guide plate. This patent makes no reference to specific probe wire diameters, no reference to the use of probe wire plating nor any reference to any relationship between these two parameters. Furthermore, there is absolutely no connection made with either one of these parameters and an offset value. There is nothing whatsoever within the '496 patent that discloses, teach or even remotely suggests a desirable relationship

among the variables p, d and L. No relevant design choices are in any way even remotely suggested by this patent.

With respect to the '794 patent, it appears to be directed to probe assemblies having pyramidal shaped contactors for which the concept of a "probe wire diameter" is totally irrelevant. Likewise, the concept of a plating layer covering their pyramidal shaped probe is also alien.

With respect to the '024 patent, the teachings found therein posit the existence of insulative coatings on their electrode probe tips. In contrast, Applicants' wire probes comprise two layers of material both of which are conductive.

Not only are these three cited patents significantly different than the presently claimed invention in major aspects, taken either alone or collectively they fail to teach, disclose or suggest that the parameters p, d, and L (as defined and specified in applicants' specification and claims) may be conjointly chosen to produce the desired goals of proper and consistent probe contact force and long probe life.

**IX. APPENDIX**

Claim 1.

A probe assembly for making electrical contact with circuit elements on an integrated circuit wafer, or the like, said probe comprising:

a first support which is substantially flat;

a second support member disposed on said first member and providing a sidewall structure which extends substantially vertically upward from said substantially flat first support;

a substantially flat mask having at least one aperture therein, said mask being supported by said second support member at a substantially uniform distance from said first support member;

a flexible, self-supporting wire probe affixed to said first support, said wire probe having a pointed end which extends at least partially through said at least one aperture, said wire probe having two substantially oppositely directed bends therein so as to permit said wire probe to flex in response to force applied to said pointed end;

said wire probe comprising a core material selected from the group consisting of platinum and platinum iridium alloys and being plated with material selected from the group consisting of nickel, gold, nickel alloys and gold alloys; and

said wire having a core diameter  $d$ , a plating thickness  $p$ , of concentrically disposed material, and an offset  $L$ , said offset being the horizontal distance between the point of affixation of said wire probe to said first support and the aperture through which said wire probe extends, said values of  $L$ ,  $p$  and  $d$  being conjointly selected so as to define a point lying substantially within acceptable regions indicated in Figures 4A through 4D.

Claim 2.

The probe structure of claim 1 in which said mask has a plurality of apertures.

Claim 3.

The probe structure of claim 2 further including a plurality of similarly structured wire probes affixed to said first support and extending through respective ones of said apertures.

Claim 4.

The probe structure of claim 1 in which said first support comprises ceramic material.

Claim 5.

The probe structure of claim 1 in which said mask comprises a polyimide layer disposed between an invar layer.

Claim 6.

A wire probe, for contacting electrically conductive pads on semiconductor wafers and similar devices, said probe comprising:

a flexible, self-supporting wire having a first end and a second, pointed end and also having two substantially oppositely directed bends therein so as to permit said wire to flex in response to force applied to said pointed end, said wire having a core diameter,  $d$ , a thickness  $p$  of plated material, and an offset  $L$ , said offset being the horizontal distance between said first end and said second end, said values of  $L$ ,  $p$ , and  $d$  being conjointly selected so as to define a point lying in the volume shown in Figures 4A through 4D.

Claim 7.

The wire probe of claim 6 in which said wire is substantially disposed within a single plane.

Claim 8.

The wire probe of claim 6 in which said bends are disposed so that flexing of said wire occurs substantially within a single plane.

Claim 9.

The wire probe of claim 6 in which said wire probe comprises a core material selected from the group consisting of platinum and platinum iridium alloys and which is plated with material selected from the group consisting of nickel, gold, nickel alloys and gold alloys.

RESPECTFULLY SUBMITTED

Date: September 17, 2003

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